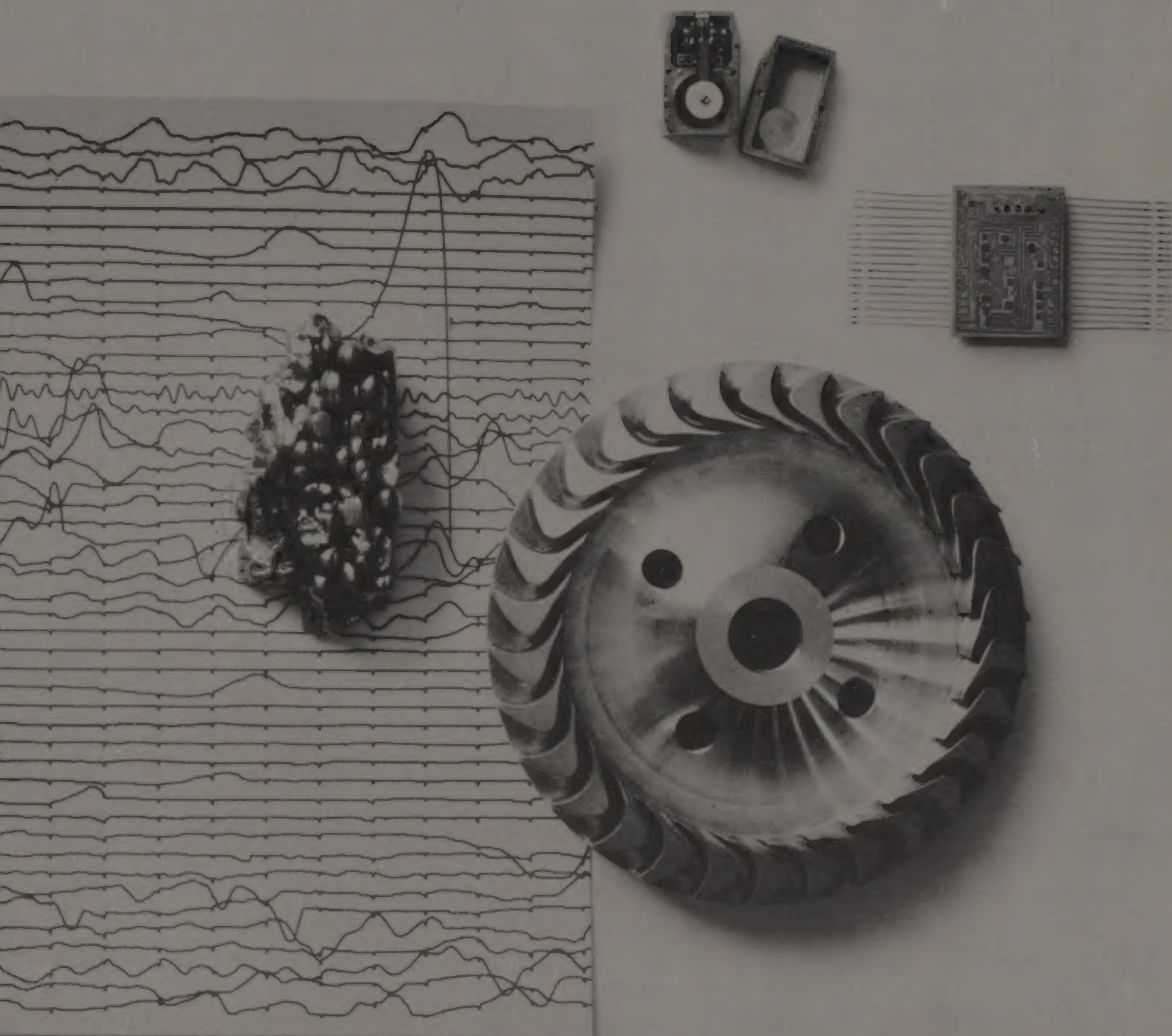
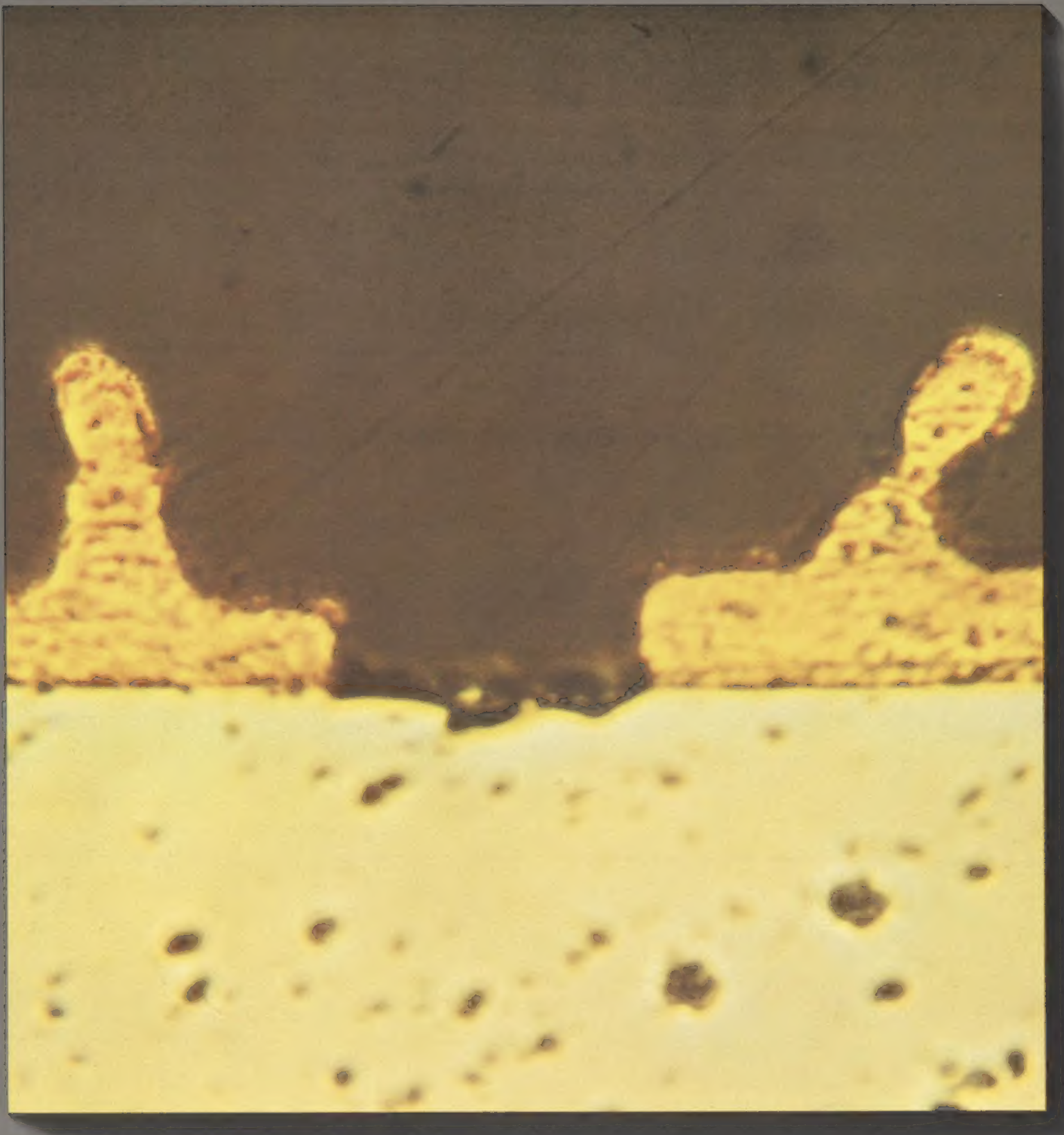
TELEDYNE, INC. ANNUAL REPORT 1966





Gold and silicon intimately bonded by metallurgical techniques to produce a transistor, which in turn assists in advancing geophysics, symbolizes the joining of the sciences in our technological era. The photograph above is a cross section of a transistor magnified 350 times.

COVER: *An accelerometer and microelectronic modular assembly; metal specimen and jet aircraft part; seismic record and earth core sample.*

CONTENTS

TO OUR SHAREHOLDERS:

In 1966, approximately 55 per cent of Teledyne's business was in electronics and control; some 23 per cent was in geophysics and oceanography; and about 22 per cent was in materials technology. What is the relationship between these fields, and how has it come about that Teledyne is in them?

In its early days Teledyne was known for the preeminence of its people in systems technology—the technique of combining a multiplicity of diverse elements to perform a complete mission. During the six years since those days Teledyne's strength in systems technology has steadily increased. In 1965, this capability was given special recognition with the award to Teledyne of a contract to develop the IHAS system—a synthesis of complex electronic and control equipments designed to permit unrestricted use of helicopters under conditions of darkness or poor visibility.

During the past three years, while our capabilities in systems technology have been maturing, our work in geophysics and oceanography has been beginning. The seismic reflection technology which our crews employ for geophysical exploration is based on the science of information theory—an electronic systems technology initially developed by the communications engineer, and applied, among other things, to the development of radar. Viewed in this perspective, our geophysical work becomes simply an application of our know-how in electronic systems technology. Our primary tool for geophysical exploration is in fact a kind of earth radar, which depends for its operation upon the transmission into the earth of specially shaped acoustic or seismic waves, and the subsequent reception and analysis of reflections of these waves to determine as much as possible about the distribution of material beneath the surface. In radar, of course, the energy is electromagnetic rather than seismic, and the transmission is into space, but the system theory and analysis is the same. The direction that Teledyne's developmental activities in geophysics is taking is thus being guided by our knowledge and understanding of electronic systems technology, leading to our current emphasis on the rapid introduction of a variety of new seismic transmitters tailored specifically to the individual job, and to a rapid conversion from analogue to digital processing of the resulting acquired seismic data.

Underlying and decisively shaping future developments in both electronics and control and in geophysics and oceanography is Teledyne's third field of interest—materials technology. During the first half of the twentieth century the great pioneers in systems technology dominated and directed the course of progress in electronics and control. Among their achievements we may

note the following: *In communications technology*, the development of methods for transmitting many messages simultaneously over a single wire or radio link by frequency or time division multiplex; and the development of modulation and communication theory permitting the reliable transmission of information over noisy channels by the use of various forms of amplitude, frequency, and pulse modulation. *In control technology*, the development of stability criteria, and the elaboration of practical methods for ensuring the stability of feedback control systems. *In computer technology*, the development of the analogue differential analyzer; the application of Boolean algebra to the synthesis of switching circuits; and the elaboration of the stored program digital computer.

But with the invention of the transistor in 1948 a shift in emphasis began. By then the theories referred to above had been relatively well developed. Since then, and particularly today, the continuous revolution taking place in electronics and control is not primarily due to any fundamental new developments in systems theory. Instead, the electronic revolution is receiving its essential thrust from advances in materials technology. These advances are radically altering the form of the hardware that performs a given job, leaving the processing performed and the function performed unchanged. Witness MEMA, Teledyne's microelectronic modular assembly, about the size of a postage stamp, performing a task that ten years ago would have required at least a trunk full of circuitry.

From these considerations it is apparent that Teledyne's interest in materials technology is basic and essential to continued progress in our chosen field. Our first commitment to materials technology was made six years ago, with the initiation of our work on semiconductor devices. Since then we have greatly increased our involvement with materials, and have broadened our capability to include a wide range of exotic alloys. In the same way that advances in electronics are now governed by advances in materials, in future times progress in control mechanisms will come to be limited by progress in the materials out of which the mechanisms are made. Teledyne's strong position in materials technology will help us to lead this progress. It gives us too a potential for additional growth in other natural and related ways from our present base.

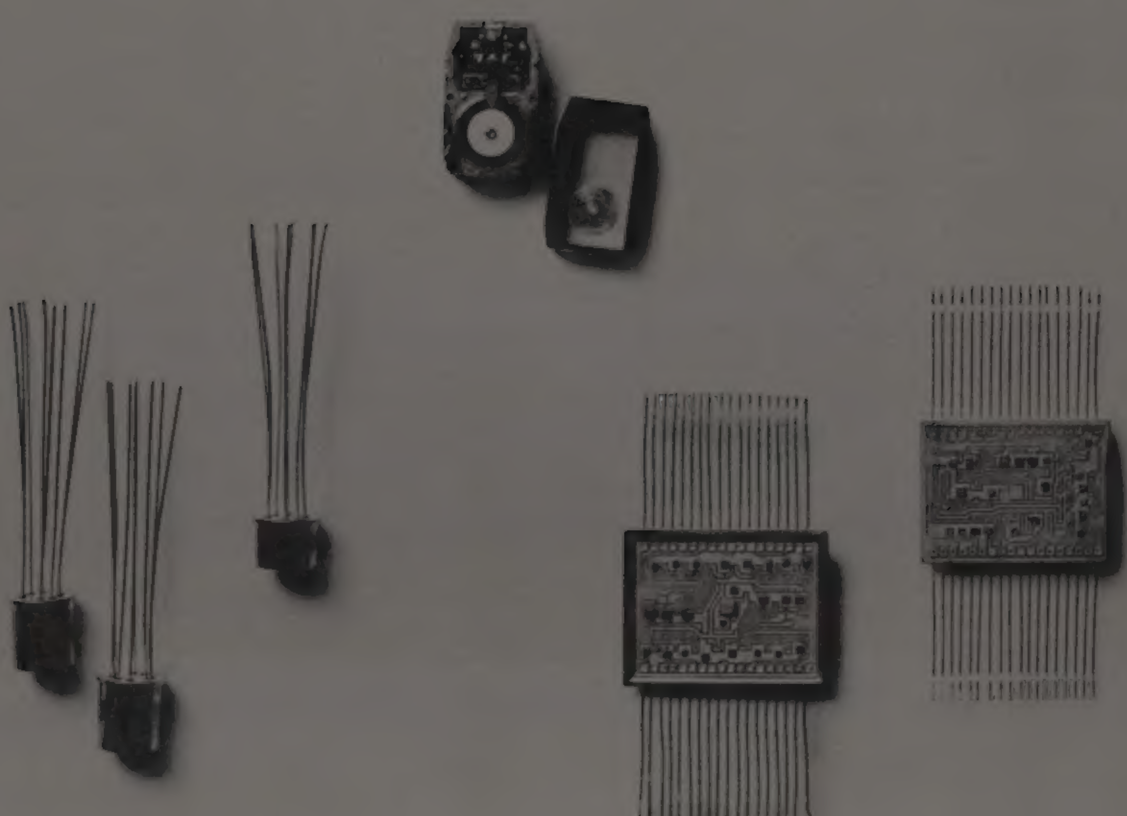
Thus we see that our three fields of interest—electronics, geophysics, and materials technology—are interrelated and dependent upon each other in an essential way; and that Teledyne's capability in each of them enhances and lends additional significance to our activities in the others.

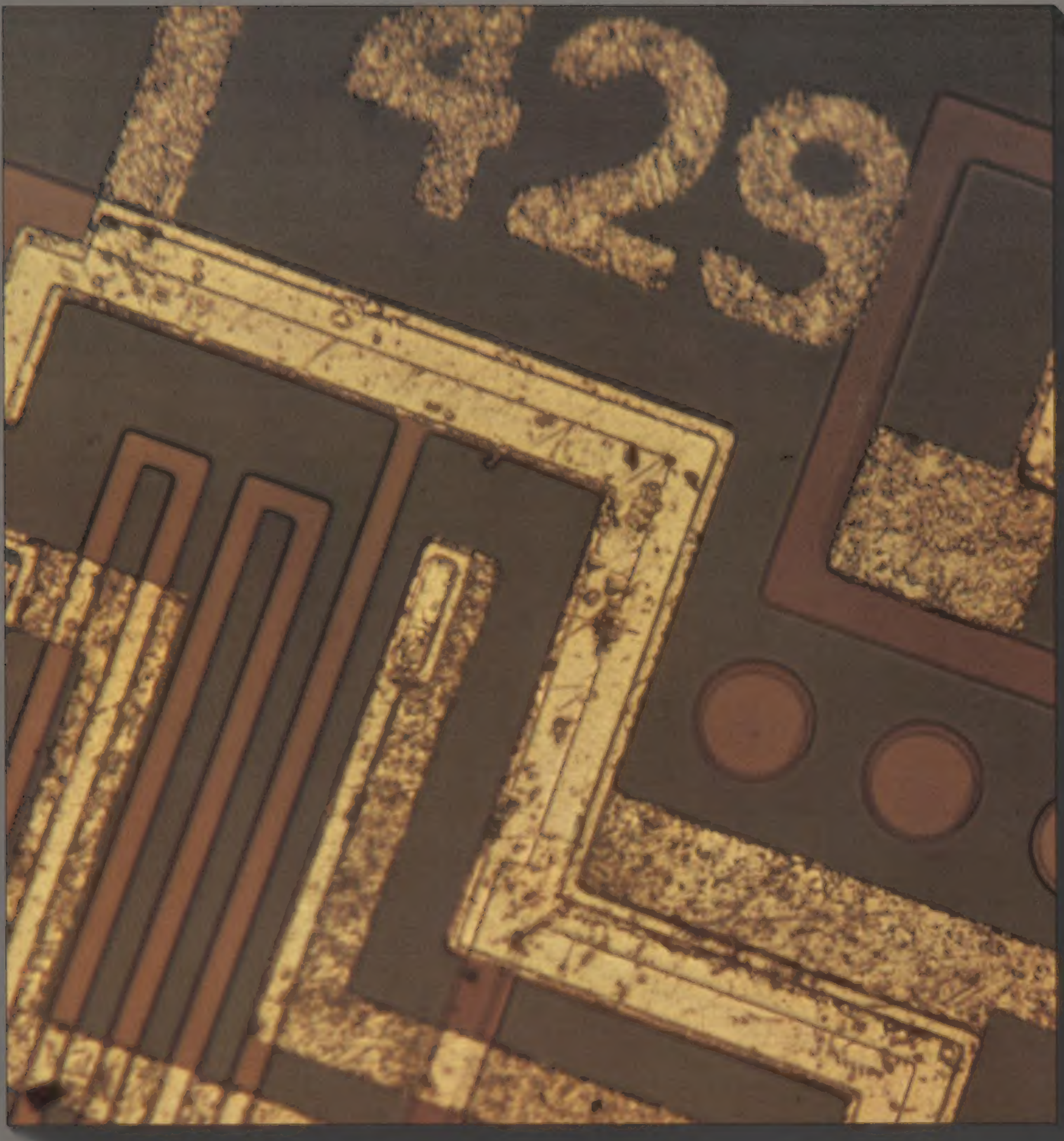
George A Roberts　　Henry E. Singleton

George A. Roberts
President

Henry E. Singleton
Chairman of the Board of Directors

ELECTRONICS AND CONTROL





At 500 times actual size a portion of a microcircuit amplifier reveals diffused resistors, transistors and diodes with metal interconnections. In prior years separate individual components were assembled to produce such a circuit. By reducing size and power requirements, microelectronic integrated circuits permit the development of electronic equipment and systems that were impossible just a few years ago. Evolving from semiconductor technology, the microcircuit promises to bring techniques of electronic communications, computation and control into new fields of human activity.

Electronics and control as it exists today began in 1906 with the invention of the triode electron tube — a device in which electrons were literally boiled off a hot wire, and their flow controlled to provide, for the first time, what the engineer terms "gain". Gain is simply the ability to use a small electric current to generate a larger one of proportional amplitude. Since that time, progress in electronics has been paced by the development of the gain-producing components required to operate at the various frequencies, power levels and sensitivities demanded.

The next great breakthrough in gain-producing devices occurred in 1948 with the invention of the transistor. A marriage of the sciences of chemistry and quantum physics, the transistor provides gain by utilizing the mobility of positive and negative charges across barriers that can be erected in semiconducting materials. The maturing of this technology is responsible for a third great breakthrough, the microelectronic integrated circuit, in which a multiplicity of transistors, diodes, resistors and capacitors are formed and interconnected entirely within a minute chip of silicon. With application to substantially every type of electronic equipment in use today, requirements for many billions of such integrated circuits in the next several years are assured. This promise was evident in 1961 when our semiconductor division was formed; today Teledyne has become one of the leading producers of integrated circuits in the country.

During the past year, Teledyne's facilities and personnel devoted to the design and manufacture of semiconductor devices have more than doubled, with a corresponding increase in the product base in both digital logic circuits and linear analog circuits. Of particular significance has been the introduction of two new operational amplifiers with characteristics superior to competitive devices currently available, and the announcement of a line of digital logic elements designed to operate in a very high electrical noise environment such as that found in industrial control applications.

In addition to the advantages of reduced cost and increased reliability, the integrated circuit offers a hundredfold reduction in size and weight. As a result, the size of equipments now produced using integrated circuits is established not by the circuits themselves but by the mechanical structure to support them, and the plugs, sockets and wire to interconnect them.

To simplify the mechanical structure and wiring, Teledyne has pioneered the microelectronic modular assembly, or MEMA, a hermetically-sealed flat ceramic package the size of a postage stamp containing some thirty integrated circuits interconnected to perform a major function. The MEMA, initially placed in production during the past year for use on Teledyne's IHAS program permits a further dramatic reduction in equipment size and weight over the use of individually-packaged microcircuits. Substantial interest is anticipated when the MEMA is released for general sale to industry.

In spite of the rapid growth in the use of integrated circuits, discrete semiconductor devices are widely used for handling high power, for precision switching, and for high frequency amplification. For such applications, Teledyne has brought out five new lines of field-effect devices during the past year, including units operable at elevated current and power levels, or at voltages which heretofore required vacuum tubes, and a version of our Fotofet with an integral diode light source, functioning as a solid state high isolation relay. We also completed development of a family of silicon n-p-n transistors directly complementary to our p-n-p line, and introduced a line of extremely low resistance p-n-p switches and integrated choppers especially useful in digital-to-analog converters.

Solid state devices still do not satisfy all of the engineers' requirements for gain. At the extremely high frequencies used for radar and space communication, the traveling wave tube, or TWT, is without peer in providing gain over the very wide bandwidths required in data transmission systems or in military countermeasures equipment. Teledyne's Microwave Electronics division designs and produces a broad line of TWT's and backward wave oscillators, covering the frequency range from the 100 MHz VHF aircraft communication band up to 40,000 MHz, well above the normal radar bands. The line includes both low noise receiving units designed to detect extremely small signals, and transmitting units generating up to tens of kilowatts of peak pulsed power. Of particular interest during the past year has been the

TOP: *Some 200 individual microcircuits on a small wafer are automatically tested before being separated and packaged for use in electronic equipment.*

Photo sensitive emulsion is applied to a silicon wafer, the initial step in a process permitting geometric designs as small as one ten-thousandth of an inch—the key to transforming a one inch disc of silicon into 4,000 transistors.

TOP: *Helices undergo high temperature processing prior to becoming the vital parts of traveling wave tubes that permit operation over a broad range of microwave frequencies. Traveling wave tubes are the heart of advanced satellite communications equipment and electronic countermeasure systems.*

While a transistor header rests in a heated holder, gold wires one-thousandth of an inch in diameter are bonded from the transistor chip to the terminal post.

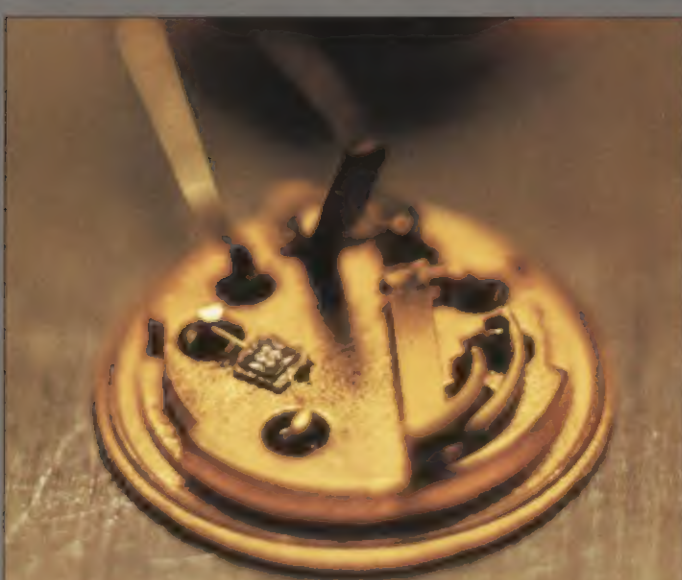
delivery of continuous-wave 12.5 kilowatt tubes for satellite communications; this is believed to be the highest average power ever obtained from a TWT.

In the companion area of microwave acoustics, our research and development activities have made us the principal supplier of microwave delay devices in the country; we are presently the primary source for related items applicable to classified countermeasures equipment. Teledyne's TWT's and related products are currently used in a number of Air Force and Navy countermeasures equipments. The ALR-20 electronic countermeasures program for which we are delivering traveling wave tubes constitutes the largest single TWT requirement in the country. We look to a further increase in our countermeasures business by virtue of our unique ability to deliver integrated packages of tubes, appropriate acoustic-type devices, and power supplies to the ECM system contractor. In preparation for increased production of microwave tubes, we are currently adding 40,000 square feet of production facility which will about double present capacity.

In addition to our work on gain-producing devices, Teledyne also supplies a variety of electronic and electromechanical components which are utilized in electronic and control equipment. Typical are microelectronic thin film resistors, made by depositing tantalum on a chip of silicon similar to that used for integrated circuits, and piezoelectric quartz crystals for exact frequency generation. Our Thermatics Division is one of the largest suppliers of Teflon-insulated wire in the country. The resistance of Teflon to heat, chemicals or aging, coupled with excellent insulating properties, has led to its almost universal acceptance for critical aircraft and space applications.

In the electromechanical area, our line of subminiature relays in TO-5 transistor cases continues to receive growing market acceptance for aircraft and space use; during the past year a high sensitivity version, with an integrated circuit amplifier in the same case, was announced. We have expanded our market for miniature sliprings and brushes used in precision instruments, and are suppliers of potentiometers, synchro and servo motors and tachometers for instrumentation purposes.

Electrical switching is also a substantial Teledyne ac-



TOP: *Individual wire strands channel through a guide and are brought together to produce one high performance multi-strand conductor for electronics applications.*

An advance in microminiaturization is accomplished by including a field effect transistor chip within a small electromagnetic relay used in vital space and aircraft applications.

tivity. For use at microwave frequencies, we manufacture a broad line of waveguide and coaxial switches including a recently-announced solid state coaxial switch capable of extremely high operating speeds. We are providing the coaxial switches, attenuators and cables used in the Apollo-LEM capsule. At the other end of the frequency spectrum, our Kinetics division is supplying motor-driven stepping and sequencing switches on virtually all major missile and space programs and on deep-diving research vessels. These units are characterized by extreme reliability, with positive contact closure and opening to endure the hostile temperature, acceleration and vibration environment. A third class of switch is that used by the operators of electronic systems. In modern aircraft particularly, where split-second communication between man and machine is critical and panel space limited, this switching and the associated visual displays and annunciators become quite complex. Typical is the fault location and audio warning system (FLAWS) being developed for the Army's AH-56 helicopter. The FLAWS monitors and logically processes over two hundred functions, performs various switching and status display tasks, and includes an audio warning, in which a recorded voice warns the pilot of any emergency condition.

In the demanding area of aircraft flight instruments, the past year marked continuing acceptance of our Automated Specialties division's Inertial-lead Vertical Speed Indicator (IVSI) which eliminates the lag in simple barometric rate-of-climb sensing devices. Formerly a visual instrument only, the IVSI is now available in versions with an electrical output for use in flight control and all-weather landing systems, and as a miniaturized unit for use where panel space is limited.

Related to vertical speed is angle-of-attack. Teledyne manufactures both vane and conical probe angle-of-attack transducers; one version or the other is used on many of the high speed Navy and Air Force aircraft operating today, such as the A-6 and F-4, and on such new aircraft as the F-111, the A-7 and the European Concorde supersonic transport. Where extreme precision is required, as in Navy carrier operations, our Approach Power Compensator automatically maintains proper angle-of-attack by control of aircraft thrust,

TOP: A Flight Progress Annunciator Panel for the All-Weather Landing System of the C-141 cargo aircraft undergoes extreme low temperature and vibration tests. When installed in the cockpit the unit advises the pilot of aircraft status and flight modes.

Conical angle of attack probes are sensors which assist the pilot in the safe handling of high performance aircraft.

assuring safe margins for control and stability outside of buffet or stall regions. For business jet aircraft, the angle-of-attack instrument has been augmented with a Mach scale to warn the pilot of buffeting conditions.

Where the basic transducers are light sensitive, extreme precision is demanded of the optics through which the light passes. Our Optical Products division is recognized as a source for optical devices of exceptional quality. We are the supplier of the observation windows for the Apollo capsule, and are also producing photographic windows of comparable precision for the reconnaissance version of the F-4 aircraft. In the infrared spectrum, we provide, in production quantities, the irdomes for the FALCON missile, and the F-4 and F-111 aircraft. For ground use, we are supplying alignment telescopes for the Shillelagh, an Army anti-tank missile. With the increasing importance to the military of surveillance and night vision devices, we anticipate an expanding market in the optical field, and to continue to increase our share of that market.

Of particular interest with respect to electronic vision devices is Microeye, Teledyne's miniature television camera. Achieving its small size and one and one-half pound weight through the use of MEMA microelectronic modules, the Microeye was made available late this year to commercial users; additional contracts have been received during the year from governmental users. Microeye can be used where physical size and weight formerly precluded television observation.

For the field of scientific and industrial instrumentation, our Analytic Instruments division has enjoyed increasing sales of thermal conductivity analyzers, used to maintain the precise mixture of gases or the exact amount of oxygen critical in many processes. We have recently completed, for a chemical processing plant, a system to detect, at a number of dispersed points, the accumulation of oxygen which would result in an explosive gas mixture; similar Teledyne systems are in use in Air Force and NASA rocket engine testing and launching facilities to detect either excessive oxygen concentration or leaks of the toxic and explosive fuel. We are supplying the specialized cryogenic instrumentation for measuring the mass flow of liquid helium during tanking operation for the Apollo-LEM.

For the measurement of water or organic gases in liquid or gaseous streams, our infrared and ultraviolet photometric analyzers are being offered. Of significant future promise are newly-announced devices for total atmosphere control. A gas chromatographic device monitors the oxygen, carbon dioxide, and water vapor critical to the preservation of perishable commodities; a recently-developed flame ionization hydrocarbon effluent detector offers potential for use in the increasingly critical field of air pollution control.

Just as electronic control systems require input data, so must they produce an output. Where large output forces are required, as in many aircraft and industrial applications, hydraulic techniques are without peer. Teledyne has established a strong position in this vital field manufacturing the valves and actuating mechanisms themselves, the fluid line fittings interconnecting them, and the inspection and test equipment for their maintenance.

In the first area, our Hydra-Power division is a major supplier of custom-designed actuators, manifolds and valves, and is currently producing such devices for numerous fixed-wing aircraft and helicopters. These products range from a novel nose-wheel steering mechanism to complex flight control actuators with tandem servo valves for fail-safe operation. Functioning at extremely high temperatures and pressures, and generating enormous forces, such actuators repeatedly demand from metallurgical technology improvements to meet increasing requirements at these environmental extremes. Our Linair Engineering division is the largest manufacturer of fluid line fittings in the country, and is represented on virtually every American aircraft and space vehicle and on many foreign aircraft. This past year we signed an exclusive licensing agreement with Douglas Aircraft Company to manufacture permanently connected brazed fittings for high pressure hydraulic systems. We anticipate applying this technology to the SST, the C5A and the Boeing 747, as well as to Douglas products.

In support of aircraft hydraulic systems, our Sprague Engineering division manufactures a variety of test and checkout equipments. Typical are high pressure and flow rate liquid power supplies for the Saturn program,

test manifold systems for the Boeing 707, 727 and 737 production lines, and a leakage analysis unit for the Douglas DC-9 as well as the familiar mobile pneumatic and hydraulic ground support equipment used by the major airlines and the U. S. Air Force.

While hydraulic techniques are best where there is a recurring demand for large forces, for functions demanding a single impulse the simplest, most reliable and least expensive energy source is the latent chemical energy in pyrotechnic devices. Our McCormick-Selph division specializes in the controlled use of explosives, producing such items as large cable cutters for the release of parachutes from satellites, gas generators for engine starting, and systems to separate crew survival capsules from damaged aircraft, or the booster stages from a space vehicle. The past year has seen substantial improvements in the devices used for these purposes. For example, our small column insulated delay line for ignition transfer and distribution has been developed to yield accurate delays ranging from as long as thirty minutes for re-entry vehicle applications down to the few milliseconds required in survival ejection systems. Our exploding bridgewire and hot-wire ignition systems, selected for use on the Pershing and Poseidon missiles, are impervious to accidental activation by stray electrical or r-f energy; our confined detonating fuse and associated transfer devices gives the unique capability to monitor the integrity of the entire ordnance distribution network by observing electrical continuity.

With the exception of pyrotechnic devices, electronic and control elements need a source of primary input power. Teledyne products in this category are transformers and reactors for both ground and airborne power distribution, and solid state and rotary power generating and conversion equipment up to 500 kilowatts. We are one of the principal manufacturers of lead-acid storage batteries for military aircraft, and are currently working on specialized units for deep submergence use.

Moving on to major electronic and control equipments, it is convenient to separate the Company activities into several broad functional categories, one of which is aircraft navigation. Here, the Teledyne minia-

TOP: *This helicopter hydraulic manifold unit controls opening, positioning and closing of the ramp and ramp doors. The precision manifold can be operated electrically from the cockpit, or manually by levers on the unit.*

One of a new generation of instruments is a cell sensitive to differences in the thermal conductivity of a pure reference gas and the same gas containing impurities. As little as 2 parts per million of nitrogen in argon, or .02 part per million of hydrogen in nitrogen can be detected.

ture inertial navigator, the Flight Reference Stabilization System (FRSS) can provide a continuous precise measure of aircraft position and the direction of North anywhere on earth no matter how the aircraft may maneuver. The smallest such equipment produced today, the FRSS capitalizes upon recent advances in electronics, materials and fabrication processes to integrate microelectronic circuitry with the primary inertial sensors to achieve substantial advancement in the state of the art from performance, weight and cost standpoints. Originally developed for the Air Force, widespread interest in FRSS has been manifested by the receipt of several contracts for varying quantities of equipments. Additionally, based upon recent test results, the Air Force has augmented the basic development program to support further effort towards even more stringent performance requirements. Applicable to fixed-wing aircraft, helicopters or missiles, and available in either self-aligning attitude and heading reference or inertial navigator versions, we believe that FRSS will find many important future applications.

FRSS provides the velocity and position of an aircraft relative to the earth's surface, but it is also desirable to know the vehicle's speed and Mach number in the air mass in which it operates. Our air data computers accomplish this function. We are supplying this critical equipment for the A-4 and A-7 aircraft, and as a portion of the IHAS system, for the CH-46, CH-53 and AH-56 helicopters. We believe that the application of the MEMA to these equipments will place us in a strong competitive position in a market which encompasses virtually all military and commercial aircraft. Under Air Force contract, we are developing a quartz transducer for air data computers for hypersonic aircraft and missiles, where air stagnation temperatures may reach 600°F. One of the uses of air data information in high-speed aircraft is as an input to stability augmentation equipment, such as that which Teledyne supplies for the F-5. Performing complex analog calculations, these equipments ensure that the handling characteristics of the aircraft remain uniform over the wide range of speeds and altitudes at which the vehicle operates.

Inherent in virtually all aircraft control systems is the need for computers to provide rapid solutions of con-

TOP An ultra high speed photograph shows metallic sheath containing high explosives detonating with a flame velocity of 21,000 feet per second. Confined explosives providing precise time delays are used for missile and space vehicle booster separation, and in aircraft crew escape systems.

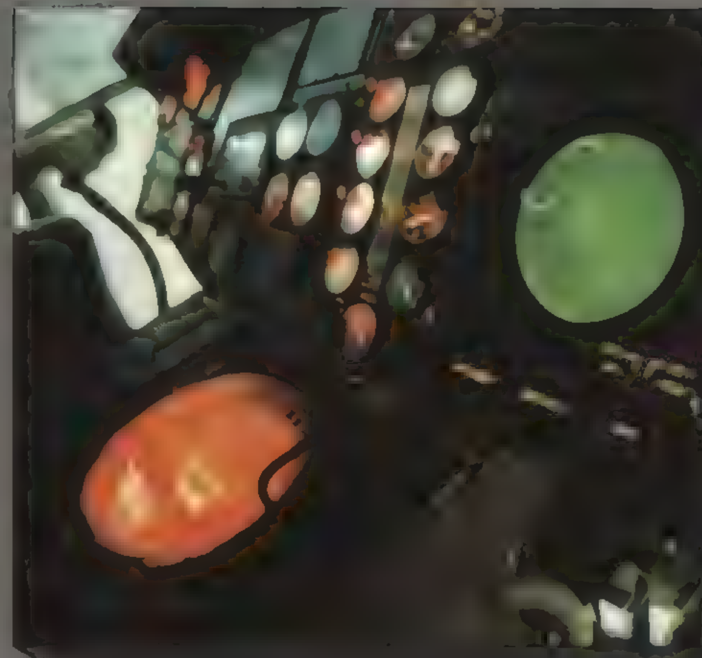
An automatic welding process [illegible] Bourdon tube pressure transducer. The Bourdon tube permits air pressure measurement in [illegible] computers which convert pressure, altitude and temperature into the aircraft's true air speed and mach number.

The smallest inertial navigator produced to date, the FASS platform is held in the gloved hands of an engineer in a dust free room. Sealed in its case, it withstands the rigors of aircraft environment and continuously provide the pilot with speed and position information.

trol equations. Because of the premium value of minimal size, weight and power, and the rigors of the environment, airborne computers are unlike commercial processors; moreover, reliability becomes of critical importance, since vehicle safety may hinge on uninterrupted error-free operation. In many ways the microelectronic machine developed by Teledyne is the most advanced equipment of this type available, since in addition to exceptionally small size, the MEMA has made possible a number of unique operational features. For example, its modular memory and modular computational elements allow expanded or reduced computing capabilities, as appropriate to each specific application, and operating speeds for real-time control formerly attainable only with less accurate and less reliable analog equipment. Initially developed to satisfy stringent airborne control requirements in the IHAS program, the computer is being developed for other applications as well.

Much of the technology of airborne digital computers is common to telemetry, the specialized communication of test and instrumentation data from an aircraft or space vehicle in flight. In the past year, Teledyne's Telemetry division continued to provide a wide variety of telemetry components and equipments for numerous missile and space programs and completed proprietary developments of new transmitters, multiplexers, and analog-to-digital converters. Of great importance is the award of a contract from the Atomic Energy Commission for a high-speed PCM system which will use the MEMA package exclusively. We expect the MEMA to provide a substantial advantage in the many telemetry applications where small size and weight and extreme ruggedness are of paramount importance. In the classical aspects of communications we continued during the year to supply ARC-73 VHF transceivers to the Army, commenced production on the SRC-20 and -21 for the Navy, and satisfied numerous orders for spare assemblies for previously-manufactured equipments.

In the growing microwave field, we continued to supply such elements as antennas, pedestals, feeds and drive servos for large ground antennas, and our solid state phase lock tracking receivers, which are used whenever a large ground antenna must be pointed at



TOP: Advanced microwave techniques make it possible to maintain automatically the close formation flight of four helicopters shown on the green stationkeeping display in the IHAS/CH-53 cockpit mockup.

A microelectronic modular assembly (MEMA) is chemically processed for later addition of integrated circuits. A completed MEMA contains the equivalent of 500 to 1,000 individual electronic components.

an object in space. In spite of their size the accuracy demands on antenna systems for space vehicle tracking and radio astronomy are unbelievably stringent. For example, the pointing accuracy of servos and mounts manufactured by our Powertronics division is such that if this report were five hundred feet away, the antenna could be centered on a single letter.

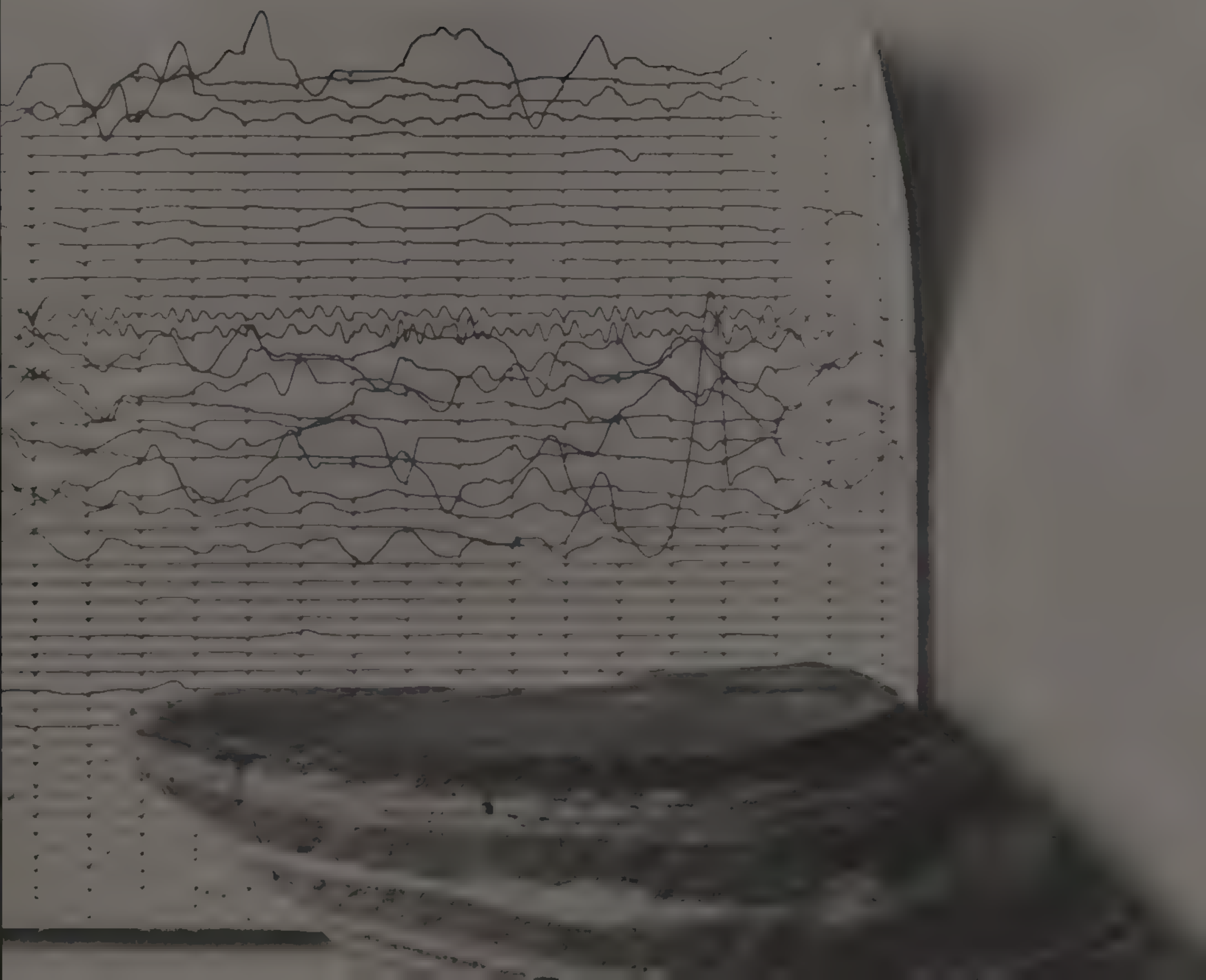
Activities in airborne microwave equipment include the continuing delivery of our Foamcone passive radar augmentors and small microwave airborne antennas, and equipments emphasizing our proprietary high resolution, wide bandwidth technology. Typical is the automatic formation flight equipment for IHAS, which allows each member of a group of closely-spaced helicopters to fly safely in formation without seeing adjacent aircraft. These techniques are also the basis for Teledyne's activities in radar cross-section measurement; during the past year our test range has continuously operated at full capacity, providing a unique service to numerous governmental and industrial organizations. Additionally, we are under contract for the design of a specialized range for a Navy facility; we anticipate later phases of the program to call for fabrication and installation of the range equipment.

Our Integrated Helicopter/VTOL Avionics System (IHAS) includes a number of equipments interconnected to perform a complete mission. Specifically, IHAS provides automatic capabilities for precision navigation, formation flight, terrain following and fire control in any combination. During the past year, we have made significant technical progress on the basic IHAS development contract; we were also awarded additional contracts from the Navy for IHAS equipments to facilitate the installation design and demonstration of the IHAS in the CH-46 Marine Corps helicopter, and from the Army and Lockheed Aircraft for IHAS equipments for the AH-56 Advanced Aerial Fire Support System (AAFSS) helicopter currently in development. Finally, based on subsystem test results to date, Teledyne has been awarded a contract for initial production quantities of IHAS navigation subsystems for early operational installation in the CH-53A and CH-46 helicopters, and other IHAS elements for the AH-56. We anticipate additional orders related to these aircraft programs in the future.

TOP: The three units comprising the basic IHAS computer will form a modular nerve center for all-weather operation of the Marine Corps' CH-53 and CH-46 helicopters, and the Army's AH-56 attack helicopter.

A fresnel zone antenna focuses microwave energy to a spot a few tenths of an inch in diameter. The equivalent of a magnifying glass, such microwave lenses are used in plasma research, to observe phenomena invisible at optical frequencies.

GEOPHYSICS AND OCEANOGRAPHY



At sunset on the Gulf of Mexico a specially equipped ship tows an electric arc seismic profiler through the dark waters. Every four seconds a bright, high voltage arc is created 20 feet below the surface producing a highly ionized bubble, which bursts, generating an acoustical signal which penetrates the floor of the sea. Reflected energy from the sub-bottom is received by trailing hydrophones and recorded on the towing ship. Continuous re-enactment of the process provides detailed information about the sub-bottom strata in the quest for oil.

In ancient times the universe was believed constructed of four elements: earth, water, air and fire; for many centuries men propitiated the gods who controlled these elements lest they unleash the energies of earthquake, eruption and flood. Such was the origin of the Geosciences, encompassing the study of the properties and structure of the earth, its seas and its atmosphere. Entering this field in late 1964, with special emphasis on geophysics and oceanography, Teledyne is recognized as a leader in both the scientific and industrial aspects of the earth and ocean sciences.

In his study of the composition, energy balance, stability and stresses of the earth, the geophysicist is limited by the earth's opacity to electromagnetic radiation to the use of low frequency mechanical, or seismic energy as his principal investigating tool. Within such constraints, the excellence of the seismic sensing instruments and the techniques used in processing the seismic data are key elements.

In this basic sensor area, the selection of Teledyne to provide an advanced state-of-the-art seismic instrumentation and data handling package for the Apollo Lunar Surface Experiments Package (ALSEP) program is particularly significant. Placed on the lunar surface by the first astronaut, the seismic package will measure the reverberations of energy induced into the lunar crust; these data may ascertain, among other things, the presence or absence beneath the surface of a layer of ice which could provide water for future explorations and possible support of life. The ALSEP package will then be left on the moon unattended to telemeter "moonquake" data to the earth. High accuracy, extreme reliability and minimal size and weight are obvious requirements for these instruments; we view the ALSEP equipments as the first in a line of seismic devices to support our national program for lunar and planetary exploration.

In addition to their space use, these instruments will substantially augment Teledyne's present line of seismic sensors. During the past year we made significant progress in the development of two new commercial instruments based on the ALSEP development. The first, a long-period triaxial seismometer and integral amplifier system only ten inches in diameter is expected to provide important down-hole, long-period data previously unattainable because of instrument size limitations. The second, a compact, high-sensitivity, short-period vertical seismometer lends itself to portable usage. Development of a horizontal version is also contemplated. Similarly, the mount, which levels both the long-period and short-period seismometers to one second of arc accuracy is expected to find application in inaccessible down-hole or ocean bottom locations.

Although small for its performance, the ALSEP triaxial seismometer exceeds the diameter of typical drilled wells. As an extension of our standard line of long- and short-period sensitive seismometers, strong motion instruments, and geophones, this past year we introduced three short-period triaxial seismometers less than four inches in diameter, offering the possibility of gathering deep down-hole seismic data at minimal expense from many abandoned oil and water wells. Future Large Aperture Seismic Array (LASA) systems may well employ sensors of this type as standard instrumentation.

With respect to seismic arrays for nuclear blast detection previously installed by Teledyne, our facility in Alexandria, Virginia remains the principal processing center for the reduction of seismological observatory data. LASA is being augmented with a long-period array, employing sixty-three Teledyne seismometers, bringing the total to five hundred and eighty-eight instruments. We look forward to the design, installation and operation of a worldwide network of such systems. With the knowledge and the continual refinement in the data reduction techniques being gained from the existing systems, coupled with the sensors now available, it is possible that such a seismic complex will provide data useful in earthquake prediction.

Characteristic of such seismic systems is an extended period of observation and the distribution of sensors over wide areas. Accordingly, in addition to the basic seismic instruments, Teledyne supplies specialized seismic telemetry equipment for transmitting data over radio or land lines where real time data processing at a central facility is required. We also manufacture on-site recording devices providing up to sixty days of continuous unattended operation for use where data need merely be collected for later reduction.

TOP: *A Teledyne developed Apollo Lunar Surface Experiments Package that measures seismic motion will be left on the moon by astronauts as part of a program to determine the moon's composition and structure.*

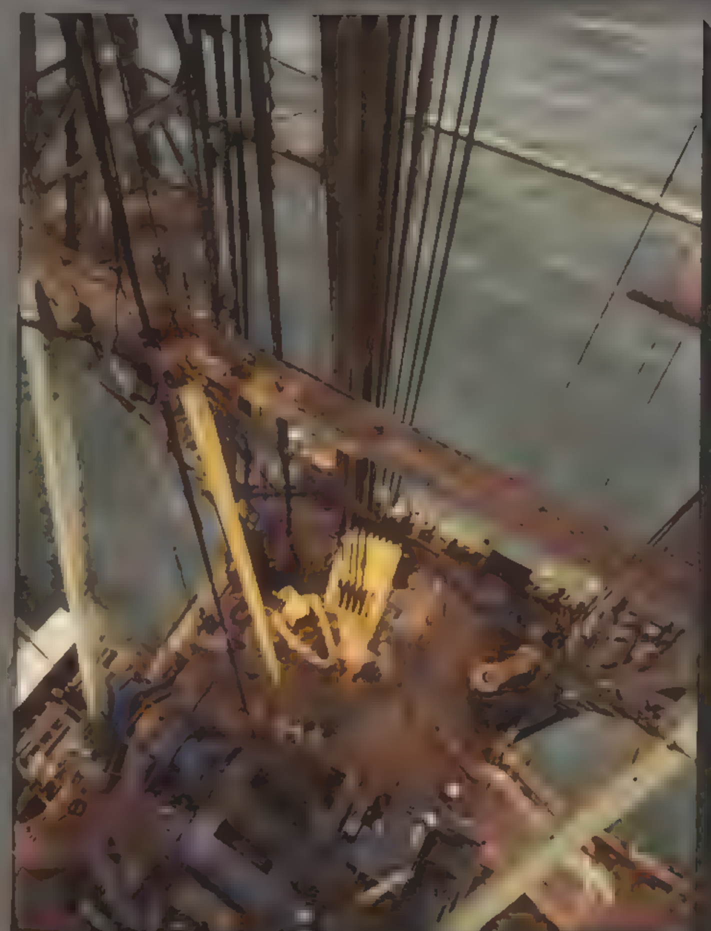
Deep-hole seismometers, designed specifically to help sort seismic signals generated by earth tremors from those resulting from underground nuclear blasts, are capable of operation at the extreme temperatures and pressures found 10,000 feet underground.

Using a three dimensional stereo plotter a skilled technician compiles a topographic map from an aerial photograph.

the obtainable resolution of subsurface strata. We expect digital acquisition to displace the classical analog approach, and have augmented our digital field and central processing facilities. Additionally, patent applications have been filed on improved methods of geochemical analysis of land and marine samples for the detection of hydrocarbons and other minerals, especially offshore sulphur deposits.

To round out our services to our geophysical survey customers, Teledyne provides drilling, logging and coring services. In the marine area, deep water coring is performed by a Boomerang Cover, which automatically sinks to the bottom, cuts a core, floats to the surface, and signals its position to the retrieval vessel. Marine drilling and construction for the offshore oil industry is the specialty of our Movible Offshore division, operating self-contained rigs of our own design and construction; typical equipment includes both submersible barges and compact platform rigs, with the capability of drilling down to 25,000 feet in water depths of eighty feet. Operating at full capacity during the past year, these mobile rigs offer the offshore oil industry significant savings over conventional fixed installations. Further supporting such marine operations, Teledyne's Sewart Seacraft division supplies highspeed aluminum crew boats for use in servicing offshore operations; the exceptional seaworthiness and reliability of these diesel-powered craft have led to their sale during the past year to domestic and foreign governmental users as well.

As contrasted with subsurface exploration, often the surface of the land—its exact position and elevation—is of primary interest. For these purposes, Teledyne's Geotronics division provides worldwide precision aerial surveying and mapping services. During the past year, operations were conducted in Iran, Africa, Tasmania, Vietnam, Korea, Japan and the Marshall Islands; typical applications are three-dimensional mapping of unexplored or inaccessible areas, route surveys, the determination of legal or political boundaries, and the establishment of exact locations, especially offshore, to accuracies of a yard or less. We are participating in a new program for the mapping and geodetic surveying of Thailand and Laos, which will be the largest such contract ever let by the U.S. Army Map Service.



TOP: An aerial photograph is projected onto a monoscopic comparator, where extremely accurate measurements are made, digitized, and processed through a computer to provide precise geographical coordinates as part of an advanced photogrammetric geodetic surveying technique.

A view from the top of an offshore rig derrick as a drill string is hoisted for refitting before again being lowered to its oil probing depths far below the floor of the sea.

TOP: A Teledyne developed Apollo Lunar Surface Experiments Package that measures seismic motion will be left on the moon by astronauts as part of a program to determine the moon's composition and structure.

Deep-hole seismometers, designed specifically to help sort seismic signals generated by earth tremors from those resulting from underground nuclear blasts, are capable of operation at the extreme temperatures and pressures found 10,000 feet underground.

Using a three dimensional stereo plotter a skilled technician compiles a topographic map from an aerial photograph.

A natural consequence of increasing awareness of the nature and mechanism of seismic disturbance is its practical consideration in the design and construction of large structures and public works projects. Typical is a complete seismic and hydrodynamic pore-pressure system designed and installed by Teledyne for a large earth-filled dam at Oroville, California. In this system, seismic pressure sensors, suspended on cables up to 2,000 feet long and buried in the dam, measure earthquake or turbulence-induced dynamic pressure variations in the water permeating the fill. Designed to provide a deeper understanding of the erosion forces on such dams, the system also includes our strong-motion accelerographs adjacent to the dam to provide information on nearby earthquakes; our seismic telemetry equipment is used to transmit data up to thirty miles to the central collection point. Seismological work is similarly being done for the State of Washington in connection with a proposed six-lane expressway and tunnel passing beneath a ship waterway in Seattle. Teledyne seismographic instruments are also regularly used to record vibratory motion in buildings and offshore ocean structures, the dynamic deflections of antennas and other large movable structures requiring high rigidity, and at the Nevada atomic weapons test site to determine structural damage caused by seismic waves from underground nuclear explosions. In support of urgent governmental needs, Teledyne is investigating seismic techniques for the remote detection of tunnels in Vietnam. Additionally, we are simulating and analyzing for the FAA the effect of sonic booms in anticipation of supersonic transport operation.

In the scientific investigation of the earth's structure, of equal or perhaps greater ultimate importance than the land area is the eighty percent of the earth's surface lying beneath the seas. During the past year, our Geotech division completed 30,000 miles of underwater seismic surveying including operations off Australia, Alaska and South America and in the North Sea and Gulf of Mexico. Bottom and sub-bottom seismic profiling down to 30,000 feet into the earth is accomplished by the release of acoustic energy in the sea, which is reflected from the bottom and the underlying strata, detected, recorded and subsequently analyzed by refined

A hydraulically activated dispensing mechanism aboard ship (below) feeds wire to a Wire Arc Seismic Section Profiler (above). Towed behind the exploration vessel, the WASSP generates acoustic energy for mapping the ocean sub-bottom by exploding the wire with a high current electrical discharge.

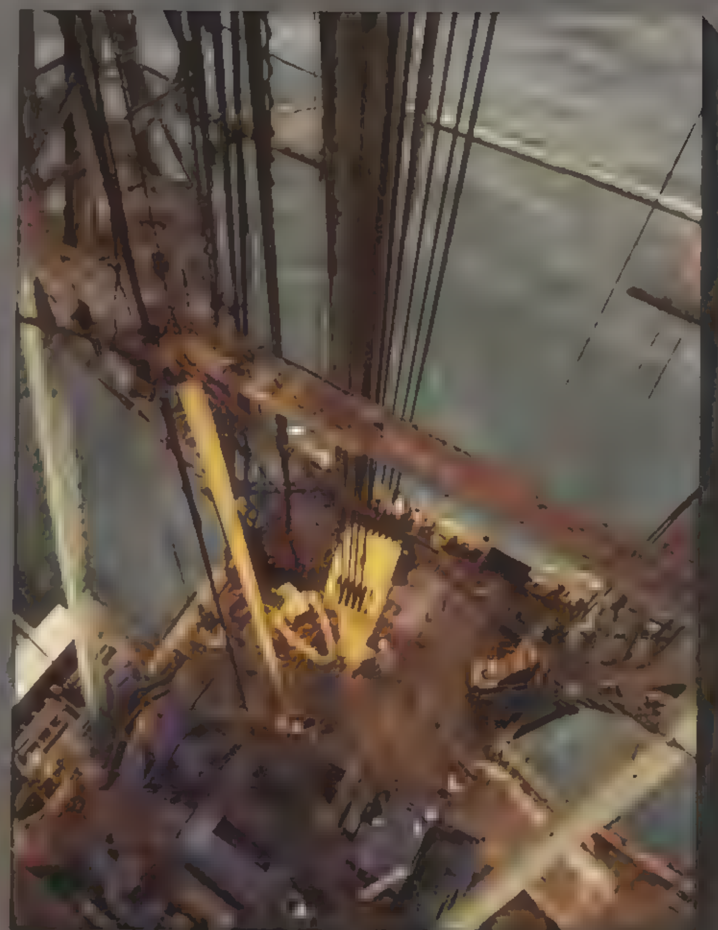
digital correlation techniques to derive the subsurface structure. For many years the seismic techniques to delineate structures were dependent on large point charges of explosives as a source of acoustical energy. Now techniques combining greater efficiency and economy with advantageous results are being applied successfully. Where maximum low-frequency acoustic energy is required for deepest penetration, the source used is a mixture of oxygen and acetylene gas which is exploded in an expanding but non-rupturing neoprene tube towed behind the survey vessel. For maximum detail in the reconstructed contours at depths down to 15,000 feet, we use, under water, the same phenomenon upon which our exploding bridgewire pyrotechnic detonators are based. A fine wire, roughly the size of a human hair, is exploded with a high energy electrical discharge to obtain uniform energy pulses of optimum shape. Teledyne's Wire Arc Seismic Section Profiler, or WASSP, provides for continuous feed and automatic replacement of the wire, with an attendant increase in surveying speed and corresponding reduction in cost. Equally important is the accuracy of the hydrophone placement; our proprietary Hydrostreamer, towed perhaps 250 feet behind the survey ship and containing up to 100 hydrophones, is automatically maintained neutrally buoyant at the selected depth, thus eliminating the use of fins or vanes which would create turbulence tending to mask the desired signal. The electrical cables for connecting the hydrophones to the boat are made by our Mecca division, which manufactures a variety of marine cables and connectors for the oceanographic industry.

Complementing these basic geophysical and oceanographic activities, Teledyne provides services to the petroleum industry and the Government in photogrammetric, gravimetric, geochemical, magnetic and seismic surveys, data reduction and analysis, and marine construction and drilling. During the year, geophysical explorations were undertaken in Somalia, Australia and Algeria, and numerous areas in the United States and Canada. Of particular importance during the past year was the introduction by our Independent Exploration division of a new digital automatic gain-ranging data acquisition system, offering substantial improvement in

the obtainable resolution of subsurface strata. We expect digital acquisition to displace the classical analog approach, and have augmented our digital field and central processing facilities. Additionally, patent applications have been filed on improved methods of geochemical analysis of land and marine samples for the detection of hydrocarbons and other minerals, especially offshore sulphur deposits.

To round out our services to our geophysical survey customers, Teledyne provides drilling, logging and coring services. In the marine area, deep water coring is performed by a Boomerang Cover, which automatically sinks to the bottom, cuts a core, floats to the surface, and signals its position to the retrieval vessel. Marine drilling and construction for the offshore oil industry is the specialty of our Movible Offshore division, operating self-contained rigs of our own design and construction; typical equipment includes both submersible barges and compact platform rigs, with the capability of drilling down to 25,000 feet in water depths of eighty feet. Operating at full capacity during the past year, these mobile rigs offer the offshore oil industry significant savings over conventional fixed installations. Further supporting such marine operations, Teledyne's Sewart Seacraft division supplies highspeed aluminum crew boats for use in servicing offshore operations; the exceptional seaworthiness and reliability of these diesel-powered craft have led to their sale during the past year to domestic and foreign governmental users as well.

As contrasted with subsurface exploration, often the surface of the land—its exact position and elevation—is of primary interest. For these purposes, Teledyne's Geotronics division provides worldwide precision aerial surveying and mapping services. During the past year, operations were conducted in Iran, Africa, Tasmania, Vietnam, Korea, Japan and the Marshall Islands; typical applications are three-dimensional mapping of unexplored or inaccessible areas, route surveys, the determination of legal or political boundaries, and the establishment of exact locations, especially offshore, to accuracies of a yard or less. We are participating in a new program for the mapping and geodetic surveying of Thailand and Laos, which will be the largest such contract ever let by the U.S. Army Map Service.



TOP: An aerial photograph is projected onto a monoscopic comparator, where extremely accurate measurements are made, digitized and processed through a computer to provide precise geographical coordinates as part of an advanced photogrammetric geodetic surveying technique.

A view from the top of an offshore rig derrick as a drill string is hoisted for refitting before again being lowered to its oil probing depths far below the floor of the sea.

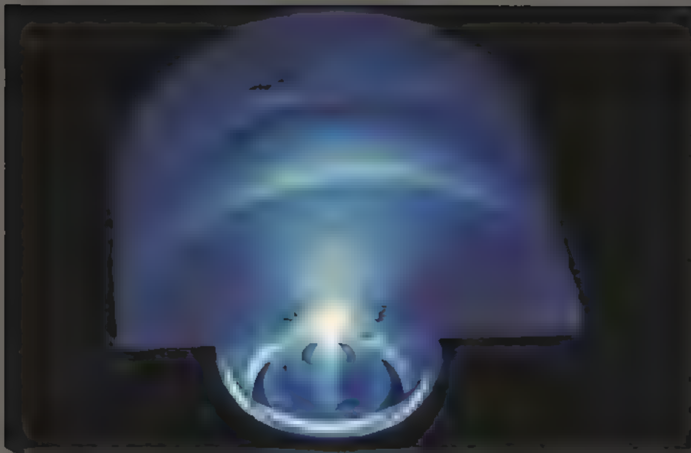
TOP: *A large recorder transcribes pump pressure, drilling time, rotary speed and other measurements necessary in monitoring offshore drilling for oil.*

A sensitive, long-period galvanometer, is painstakingly calibrated for use in a seismic recording system.

Using advanced data acquisition techniques, seismic information is recorded in digital form, processed in a digital computer, and then converted to visual form. The records reveal the conformation below the earth's surface, pinpointing regions where petroleum may lie.

MATERIALS TECHNOLOGY

Microstructure of a superalloy is magnified 500 times after testing at high temperature and load for an extended period of time, in some cases up to several years. Information from tests aid metallurgical science to provide the key to advancements in such areas as aviation and space, where materials pace the realization of theory.



The year 1966 is especially noteworthy in that it marked the emergence of Teledyne as a prominent member of the metallurgical and materials industry. The Teledyne Materials group, consisting of Vasco Metals and other technologically related Teledyne organizations, with facilities throughout the world, concentrates its efforts in the field of advanced metallurgical processes and products, and enjoys a strong position in the specialized alloys field. Specifically, Teledyne's materials activities relate to the use of titanium, tungsten, molybdenum, vanadium, zirconium, nickel, cobalt, aluminum and magnesium; these metallic elements, when used alone or when alloyed together or with iron, display combinations of high strength-to-weight ratio, excellent corrosion and oxidation resistance, strength retention at extreme temperatures, dimensional stability, and fatigue resistance superior to conventional materials.

Continuing improvements in these characteristics will be necessary to the success of future aircraft and space vehicles, supersonic transports, high-performance turbine and rocket engines, and nuclear power generators. As the complementary technologies upon which these products depend advance, the demands placed on materials will escalate. For example, the supersonic transport could reach skin temperatures of perhaps 1,000°F; hypersonic aircraft and re-entry vehicles already in research will reach temperatures of 2,000°F. Aircraft jet engines operate at 2,000°F currently, but to achieve the perhaps forty percent improvement in efficiency needed in the future, temperatures approaching 3,000°F must be endured. It is clear that as the scientific theories and laboratory curiosities of today are reduced to practical and controllable realities, they will create vast new markets for specialized metals; your Company's present position in this market provides an exceptional base from which to profit from its growth.

Of paramount importance in the exploitation of these materials is the need for deeper understanding of fundamental crystallographic, electrical and chemical characteristics to support the development of new alloying and fabrication processes. Teledyne's Materials Research Company fulfills this basic role, employing the most advanced metallographic equipment and digital analysis techniques to study the metallurgical struc-

TOP: *Encapsulated metal particles are microscopically examined during laboratory analysis in materials research.*

A chemist observes a gas analysis furnace as metal is melted in vacuum at 3,000°F to determine nitrogen, oxygen and hydrogen content.

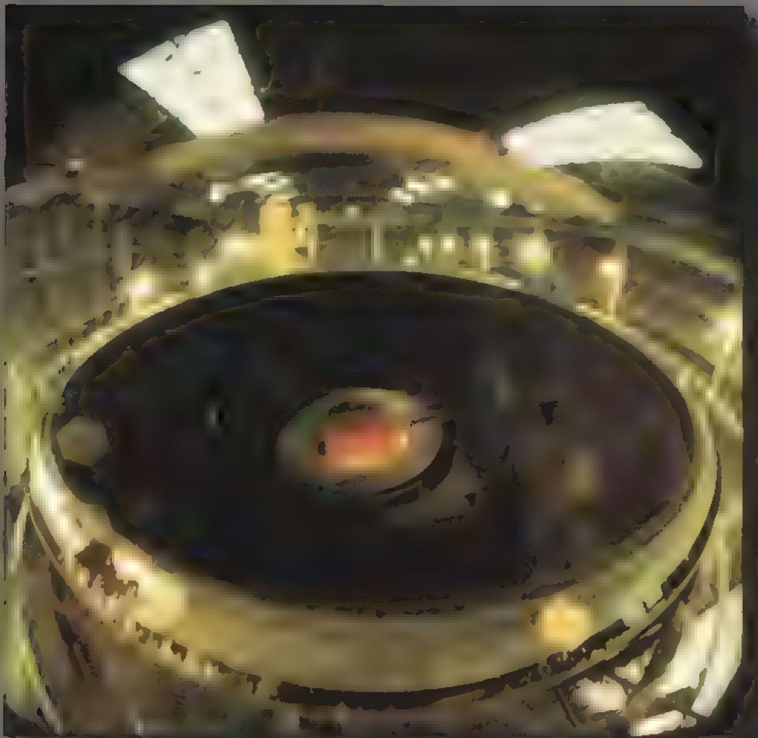
tures and properties of complex alloys, not only in support of our own proprietary materials development, but for government, academic and other commercial organizations as well. Complementing our applied research, Teledyne maintains extensive materials testing laboratories for evaluating bulk materials and fabricated shapes in controlled environments, and provides structural design and analysis services with emphasis on naval, offshore and oceanographic projects.

Teledyne's activity in metallurgy has, from the scientific standpoint, responded to this need for metals of higher performance, purity and reliability. The key to the ability of Teledyne to fulfill these demands for production quantities of special metals for aircraft structural members and landing gear, jet engine rotating components, rocket cases, and high-temperature bearings is the processing of metals by vacuum technology. Pioneered at our Allvac plant for nickel alloys and at Vasco for ferrous alloys, these processes commence with pure metallic elements which are melted in vacuum induction furnaces with capacities up to 16,000 pounds to form the basic alloy, which is cast into electrodes for remelting in a vacuum consumable electrode furnace. Here, these special metals are arc melted at temperatures over 5,000°F in atmospheres containing less than one part of air for each 750,000 parts normally present, and refined by casting and freezing quickly in crucibles of copper cooled by rapidly-circulating water. Production lots receive both macro and micro inspections, typically involving ultrasonic, eddy current and zyglo tests, and optical emission or X-ray spectrometry. A recent highlight has been the development of Astroloy, a proprietary alloy which provides the strongest high-temperature characteristics of any wrought metal; our new Rene 41 alloy combines excellent high-temperature performance with superior corrosion resistance.

Many uses require that special metals be produced in rod or wire form. Because such metals are often difficult to work, and react with furnace atmospheres, Teledyne utilizes vacuum annealing, specialized pickling and ultrasonic cleaning processes, then packages the completed product in containers that are evacuated or purged and filled with argon and sealed, so that in many

TOP: *Slices cut from a superalloy ingot, produced by double vacuum melting, will be metallurgically evaluated prior to further processing.*

High strength, high temperature special metal wire is produced to exacting specifications for aviation, electronic and industrial applications.



A 3,000 pound superalloy ingot produced by the double vacuum melting process is removed from a soaking furnace - later to be shaped and further treated for use in high strength, high temperature products

TOP Bubbles of carbon monoxide gas emerge from an eight ton boiling bath of superalloy metal during the vacuum induction melting process A topside view of the huge furnace is on the left

instances the wire approaches surgical cleanliness at time of shipment. Specifically, we supply zirconium or zircaloy for atomic reactor use, tantalum for electronic components, columbium-tin and columbium-zirconium alloys which become superconductors at cryogenic temperatures, and titanium. Often referred to as the "wonder metal" for supersonic aircraft use, titanium is supplied by Teledyne in the form of welding wire and fastener stock, and sheet and extruded shapes for aircraft skin and structural members. Teledyne is participating in the expanding titanium market by installing new facilities for melting, forging and rolling, and we are enlarging our titanium product and process development and evaluation program.

Teledyne's Vasco Metals complex is a major source of tool, die and specialty steel alloys for military, space and commercial applications. The product line includes a comprehensive family of high-speed and high-strength steels which are finding increasing use throughout the world as the mass production techniques pioneered in this country are adopted by other nations. Within the United States the market is continually expanding as a result of increased usage of materials formed, cut and shaped by Teledyne alloys. A significant development in this area in the past year has been the creation of a new matrix steel with a yield strength of 350,000 psi, over 50,000 psi greater than previously obtained.

Of particular importance is Teledyne's activity in maraging alloys. Conventional alloys, in order to obtain their ultimate strength are subjected to heat treating involving quenching and tempering following their fabrication. The maraging steels, however, depend on an aging phenomenon rather than normal heat treating to obtain the desired qualities; thus, whereas a standard heat treatment might require long hours at elevated temperatures, maraging materials need only a mild heating for substantially shorter times. Marketed under the trade name Vascomax, these alloys have applications in aerospace activities as well as in precision tooling. In this latter area particularly, they have enjoyed wide acceptance, where high production rates are demanded. As a die material, for example, although perhaps three times as expensive as conventional metals, they have exhib-

ited over twenty-five times the life, achieving runs in excess of 100,000 parts on one die.

During the past year Teledyne began to serve the aviation and space field with precision castings of high temperature alloys and of aluminum, magnesium and stainless steel. Many lightweight castings of magnesium and aluminum will be found in the same aircraft that elsewhere employs castings or forgings of nickel alloyed with aluminum, titanium, cobalt, chromium and boron, which are stronger at the extreme temperatures of jet engine operation than the aluminum is at room temperature. Teledyne's method of casting produces end items with little or no requirement for subsequent surface finishing or machining. The resulting quality and inherent economy of the process has opened new markets heretofore denied to cast materials.

The joining of metals so as to have the completed item retain the strength and characteristics of the component pieces has long posed one of the most difficult technical problems in the materials field. In many applications, conventional welding is adequate; our Glenn Pacific division participates in this market as a major producer of high-power welding equipment. Frequently, however, conventional welding techniques are not suitable. Materials subject to distortion or weakening because of thin heat sensitive areas or complex metallurgical reactions demand special processes; moreover, it often occurs that the very properties which render a material desirable also create fabrication difficulties. In many cases, Teledyne's proprietary hot forming and vacuum processing techniques solve these problems; in other applications, however, electron beam welding is becoming the preferred method of bonding. Using power densities of up to six million watts per square centimeter, rapid welds of high depth-to-width ratio are achieved in a vacuum, thus effectively preventing either heat damage or gas contamination. Electron beam welding also provides a continuous production process for the fabrication of composites, in which two or more metals are intimately joined to provide a combination of characteristics unattainable in an individual metallic material. We are one of the largest operators of electron beam welding equipment in the United States, and we have recently expanded our services to Europe.

TOP: *Ultraviolet fluorescent penetrant inspection is one of the many examinations to which special precision castings are subjected before shipment.*

Cross sections of jet aircraft engine turbine blades produced from high performance alloys are ready for metallographic analysis to determine internal crystalline structure.

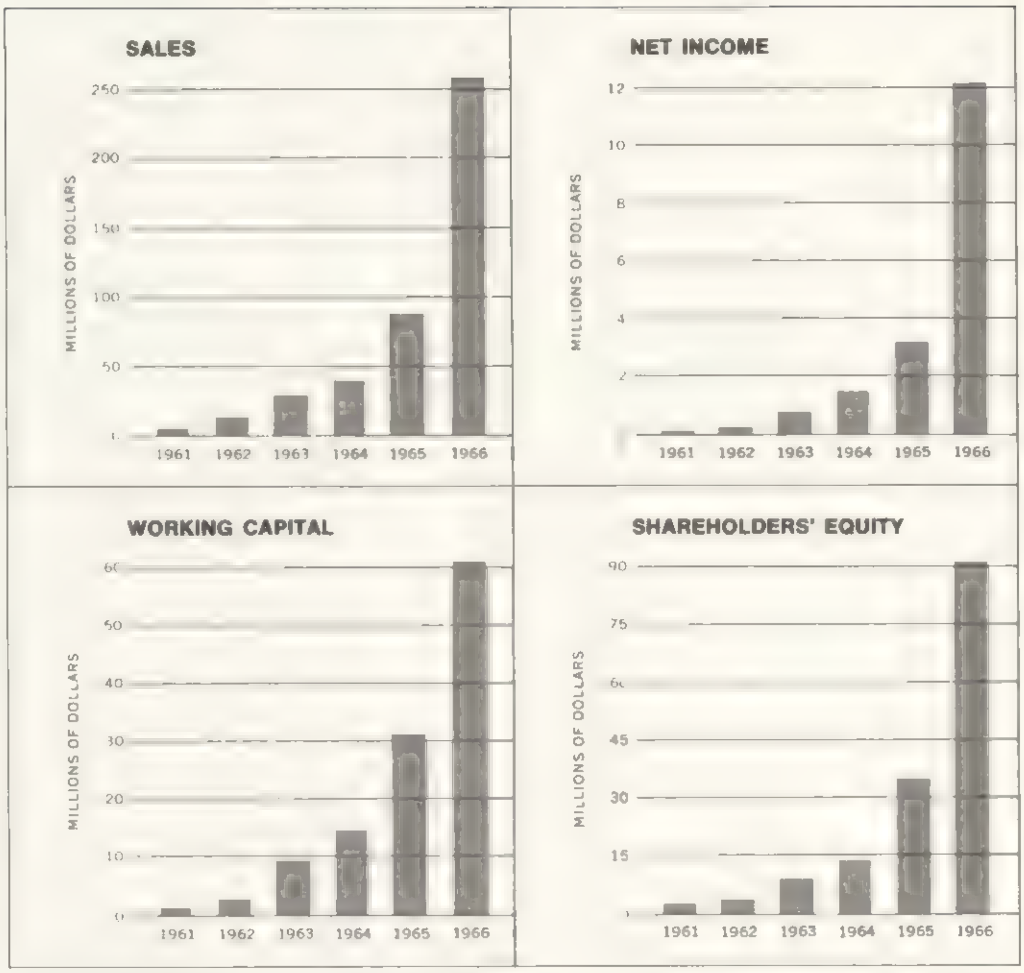
FINANCIAL STATEMENTS

HIGHLIGHTS FROM OUR ANNUAL REPORTS

OPERATING RESULTS	1966	1965	1964	1963
Sales	$256,751,000	$86,504,000	$38,187,000	$31,925,000
Net income before Federal income taxes	22,185,000	6,502,000	2,979,000	1,505,000
Provision for Federal income taxes	10,150,000	3,100,000	1,538,000	774,000
Net income	12,035,000	3,402,000	1,441,000	731,000
Net income per common share	3.67	1.98	1.34	0.76
FINANCIAL POSITION (YEAR END)				
Working capital	$ 60,543,000	$30,803,000	$14,220,000	$ 9,263,000
Total assets	170,369,000	66,544,000	35,040,000	23,901,000
Shareholders' equity	90,205,000	34,765,000	13,672,000	8,629,000
GENERAL STATISTICS (YEAR END)				
Average number of common shares outstanding	2,682,116	1,681,407	1,018,292	834,494
Number of employees	13,900	5,400	2,400	1,900

The figures in this table are taken from previous annual reports without adjustment for subsequent poolings of interests. Net income excludes special credits of $356,000, $1,104,000, $549,000 and $175,000 in 1965 through 1962 respectively. Net income per common share is based on the average number of shares outstanding during each year after provision for dividends on preferred stock. On the basis of including operations of pooled companies prior to the years of acquisition, results for the years 1965 through 1962 would have been as follows: Sales — $196,221,000, $145,474,000, $135,199,000, $113,994,000; Net Income — $8,610,000, $5,949,000, $5,329,000, $4,871,000; Net Income per Common Share — $2.67, $1.94, $1.77, $1.72

1962	1961
$10,438,000	$4,491,000
344,000	133,000
187,000	75,000
157,000	58,000
0.25	0.13
$ 2,546,000	$1,614,000
10,844,000	3,731,000
3,527,000	2,477,000
632,049	460,514
950	450



CONSOLIDATED BALANCE SHEETS

October 31, 1966 and 1965

ASSETS

	1966	1965
CURRENT ASSETS:		
Cash	$ 8,662,000	$ 8,623,000
Receivables—		
Accounts receivable, less reserve	33,111,000	24,845,000
Reimbursable costs and fees under defense contracts	12,419,000	12,268,000
Inventories, at the lower of cost (principally first in, first out) or market, less progress billings of $5,090,000 in 1966 and $3,427,000 in 1965	52,198,000	42,052,000
Prepaid expenses	1,699,000	1,512,000
Total current assets	108,089,000	89,300,000
PROPERTY AND EQUIPMENT, at cost:		
Land, including $3,335,000 in 1966, and $2,432,000 in 1965 representing cost of land held for expansion	5,496,000	4,401,000
Buildings	17,898,000	14,038,000
Equipment and improvements	67,576,000	58,496,000
	90,970,000	76,935,000
Less—Accumulated depreciation and amortization	39,068,000	33,127,000
	51,902,000	43,808,000
OTHER ASSETS:		
Cost in excess of net assets of purchased businesses	6,167,000	5,841,000
Other	4,211,000	5,950,000
	10,378,000	11,791,000
	$170,369,000	$144,899,000

The accompanying notes are an integral part of these balance sheets

LIABILITIES

	1966	1965
CURRENT LIABILITIES:		
Notes payable—		
Banks	$ 6,543,000	$ 4,848,000
Other	2,124,000	907,000
Current portion of long-term and subordinated debt	4,596,000	4,727,000
Accounts payable	19,956,000	14,843,000
Accrued liabilities	10,777,000	10,320,000
Federal income taxes	3,550,000	5,220,000
Total current liabilities	47,546,000	40,865,000
LONG-TERM DEBT (Note 2)	20,704,000	23,481,000
SUBORDINATED DEBT (Note 2)	10,261,000	2,968,000
DEFERRED INCOME	643,000	865,000
RESERVE FOR EMPLOYEE PENSION BENEFITS (Note 5)	1,010,000	973,000
SHAREHOLDERS' EQUITY:		
Preferred stock, $1 par value, authorized 1,500,000 shares- Series A, outstanding 71,685 shares in 1965	—	72,000
$3.50 cumulative convertible preferred series, outstanding 624,132 shares in 1966, and 610,931 shares in 1965 (Note 4)	624,000	611,000
Common stock, $1 par value, authorized 6,500,000 shares; outstanding 2,741,237 shares in 1966 and 2,562,295 shares in 1965 (Notes 1 through 5)	2,741,000	2,562,000
Additional paid-in capital	43,633,000	39,537,000
Retained earnings (Notes 2 and 4)	43,207,000	32,965,000
Total shareholders' equity	90,205,000	75,747,000
	$170,369,000	$144,899,000

CONSOLIDATED STATEMENTS OF INCOME

For the Years Ended October 31, 1966 and 1965

	1966	1965
SALES AND SERVICE REVENUES	$256,751,000	$196,221,000
Cost of sales and services	199,136,000	150,634,000
GROSS PROFIT	57,615,000	45,587,000
Selling and administrative expenses	33,023,000	27,093,000
INCOME FROM OPERATIONS	24,592,000	18,494,000
Interest expense	2,407,000	1,861,000
NET INCOME BEFORE FEDERAL INCOME TAXES	22,185,000	16,633,000
Provision for Federal income taxes	10,150,000	8,023,000
NET INCOME	$ 12,035,000	$ 8,610,000

Costs and expenses include provisions of $7,879,000 in 1966 and $7,334,000 in 1965 for depreciation and amortization of property and equipment.

The accompanying notes are an integral part of these statements.

CONSOLIDATED STATEMENTS OF RETAINED EARNINGS

For the Years Ended October 31, 1966 and 1965

	1966	1965
BALANCE, BEGINNING OF PERIOD ([illegible])	$32,965,000	$25,909,000
ADD OR (DEDUCT):		
Net income	12,035,000	8,610,000
Reduction in Federal income taxes due to carryforward of losses incurred by purchased companies prior to dates of acquisition	—	356,000
Dividends paid by pooled companies prior to dates of pooling	(1,449,000)	(1,836,000)
Cash dividends paid on preferred stock	(344,000)	(74,000)
BALANCE, END OF PERIOD	$43,207,000	$32,965,000

The accompanying notes are an integral part of these statements.

CONSOLIDATED STATEMENTS OF ADDITIONAL PAID-IN CAPITAL

For the Years Ended October 31, 1966 and 1965

	1966	1965
BALANCE, BEGINNING OF PERIOD (Note 1)	$39,537,000	$27,672,000
ADD:		
Difference between proceeds and par value of capital stock issued by pooled companies prior to acquisition	3,198,000	—
Difference between proceeds and par value of common stock issued under stock option plans (Note 3), warrants and Convertible Debentures	838,000	206,000
Difference between fair value and par value of common stock issued in connection with purchases of businesses	60,000	4,090,000
Difference between net sales price and par value of common stock sold	—	7,569,000
BALANCE, END OF PERIOD	$43,633,000	$39,537,000

The accompanying notes are an integral part of these statements.

ARTHUR ANDERSEN & CO.

To the Stockholders and Board of Directors, Teledyne, Inc.:

We have examined the consolidated balance sheets of TELEDYNE, INC. (a Delaware corporation) and subsidiaries as of October 31, 1966 and 1965, and the related statements of income, additional paid-in capital, and retained earnings for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying financial statements present fairly the consolidated financial position of Teledyne, Inc. and subsidiaries as of October 31, 1966 and 1965, and the results of their operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Los Angeles, California,
November 23, 1966.

ARTHUR ANDERSEN & CO.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

October 31, 1966

NOTE 1: PRINCIPLES OF CONSOLIDATION

The consolidated financial statements include the accounts of the Company and all of its subsidiaries. During the year, the Company acquired the net assets of several businesses which have been accounted for as poolings of interests. The 1965 financial statements have been restated to include these businesses. The results of operations of purchased businesses are included since acquisition.

NOTE 2: LONG-TERM AND SUBORDINATED DEBT

LONG-TERM DEBT - At October 31, 1966, long-term debt consisted of the following:

5¾ % and 6¼ % bank notes payable in installments to 1971	$18,250,000
Other (including $5,548,000 secured by land and buildings)	6,812,000
	25,062,000
Less - Current portion	4,358,000
	$20,704,000

SUBORDINATED DEBT - At October 31, 1966, subordinated debt consisted of the following:

5½ % Convertible Subordinated Notes, $317,000 payable annually from 1969 to 1981, convertible into common stock at $115.00 per share	$ 7,610,000
5¾ % Convertible Subordinated Notes, $83,000 payable annually to 1978, convertible into common stock at $27.50 per share until May, 1968, and $35.00 thereafter	2,000,000
6½ % Convertible Subordinated Debentures, $100,000 payable annually to 1970, convertible into common stock at $27.50 per share	400,000
6¼ % Convertible Subordinated Debentures, due 1971, convertible into common stock at $101.02 per share	197,000
Other, payable in installments to 1971	292,000
	10,499,000
Less - Current portion	238,000
	$10,261,000

Under the various borrowing agreements, the Company has agreed to maintain minimum amounts of working capital and net worth plus subordinated debt, and has agreed to certain restrictions with respect to borrowings, purchase and sale of assets

and capital stock, and payment of dividends. At October 31, 1966, these agreements were complied with and retained earnings of $4,225,000 were not restricted as to payment of dividends.

The Company has reserved approximately 155,000 shares of its common stock for issuance upon conversion of subordinated debt.

NOTE 3: STOCK OPTIONS

At October 31, 1966, 115,842 common shares (of which 34,921 were exercisable) were reserved for issuance under outstanding options at prices from $15.75 to $90.00 per share and 77,224 common shares were reserved for the granting of additional options. At October 31, 1965, 98,116 common shares were reserved for issuance under outstanding options and 113,614 common shares were reserved for the granting of additional options. During 1966, options to purchase 42,008 common shares were granted; options to purchase 18,664 shares were exercised; and options covering 5,618 shares expired or were canceled.

NOTE 4: PREFERRED STOCK

The preferred shares outstanding at October 31, 1966, are entitled to voting rights, cumulative annual dividends at the rate of $3.50 per share, and preference of $60.00 per share ($37,448,000 in total) in liquidation. They are redeemable at $100.00 per share after June 30, 1971, and are convertible at any time into common stock on a share for share basis. The Company has reserved 624,132 common shares for conversion of the preferred shares.

NOTE 5: COMMITMENTS AND CONTINGENT LIABILITIES

Annual rentals under long-term leases expiring between 1969 and 1982 are approximately $1,800,000 through 1971, and $200,000 thereafter.

The Company is contingently liable as guarantor of a $4,247,000 note payable by certain stockholders who have secured the note by pledge of a maximum of 82,468 shares of their Teledyne Common stock.

A maximum of 155,000 common shares may be issued to shareholders of acquired companies dependent upon future events.

The Company has several pension plans under which it contributes to trust funds the actuarial value of pension benefits upon the employees' retirement. At October 31, 1966, the actuarial value of earned pension benefits to be contributed in future years upon retirement of employees was approximately $12,000,000. The Company had made all contributions required by the plans through October 31, 1966.

TELEDYNE, INC.

BOARD OF DIRECTORS

Henry E. Singleton, Chairman

George Kozmetsky

George A. Roberts

Arthur Rock

Claude E. Shannon

Robert B. Sprague

OFFICERS

Henry E. Singleton,
Chief Executive Officer and
Chairman of the Board of Directors

George A. Roberts, President

James F. Battey, Vice President

A. V. Holmlund, Vice President

Frank W. T. LaHaye, Vice President

Jay T. Last, Vice President

James D. Nisbet, Vice President

H. J. Smead, Vice President

Robert B. Sprague, Vice President

Teck A. Wilson, Vice President

George L. Farinsky, Treasurer

J. Spencer Letts, Secretary

CORPORATE HEADQUARTERS

12525 Daphne Avenue

Hawthorne, California

TRANSFER AGENTS

Bank of America, N. T. & S. A.

111 West Seventh Street

Los Angeles, California

United States Trust Company of New York

45 Wall Street

New York, New York

REGISTRARS

Security First National Bank

124 West Fourth Street

Los Angeles, California

First National City Bank

55 Wall Street

New York, New York